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CLASSIFICATION: Key to Insect Control



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Entomologist Douglas C. Ferguson selects specimens for study from the more than 24 million insects stored in 58,000 drawers in the National Insect Collection. He is compiling a comprehensive reference work on the tussock moth family—of which the forest-destroying gypsy moth is a member (0277x147-36).



The subtle differences—and similarities—in these greatly magnified (250X) photomicrographs of the external sex organs of moths and butterflies aid Dr. Ronald W. Hodges in his studies. Entomologists often find that an insect species can be more accurately defined by characteristics of sex organs than by shape, size, color or wing pattern (0277x144-18A).

Of the millions who visit the Smithsonian Institution's Museum of Natural History, only a few know that it houses the 24.5 million specimen National Insect collection. Standing before the museum are Dr. Ronald W. Hodges (right), Chief of the Systematic Entomology Laboratory and Dr. Lloyd Knulson, Chairman of ARS' Insect Identification and Beneficial Insect Introduction Institute, of which SEL is a part (0277x148-33A).



CLASSIFICATION: Key to Insect Control

Identifying insects is a lot like solving mysteries. Entomologists at the ARS Systematic Entomology Laboratory (SEL) solve between 250,000 and 350,000 such insect identification mysteries every year for the public, plant inspectors, farmers and scientists who need to know the identity of a particular insect. Accurate identification is essential before the potential value or destructiveness of an insect can be determined. Without it, costly mistakes are possible.

The basis for accurate identification lies in research on the classification of an estimated 10 million insect species (only 1 million have been described), the primary work of the 29 SEL entomologists.

Flies, beetles, moths, ants, bees, wasps, sawflies, and true bugs are the largest and most economically important of all insect groups. SEL scientists often need to limit the scope of their research to a single order—such as biting flies, grasshoppers or scale insects. Such specialization is essential to identify and classify insects properly.

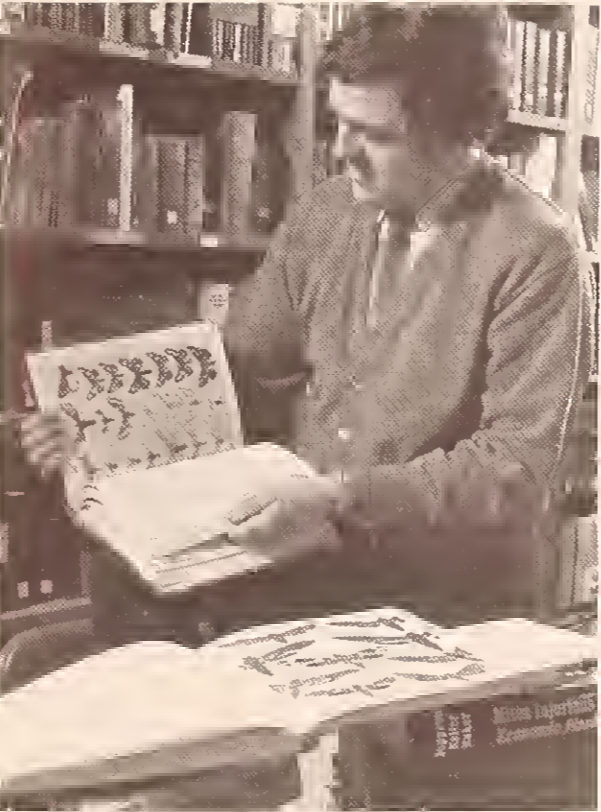
Such features as wing veins, antenna structure, legs, head, scales and sex organs are studied to determine exact insect identification. To do this properly, an almost unbelievable amount of information is needed.

Their vast knowledge of insects uniquely enables SEL scientists to work also on such diverse projects as a manual of the moths of America north of Mexico and a guide for identification of insect fragments in food for the Food and Drug Administration.

The National Collection of Insects, consisting of 24.5 million specimens, is the essential resource for the SEL research and service program. This national resource, the largest scientific collection of insects in the world, and the associated library are housed at the Smithsonian Institution in Washington D.C. and at the Agricultural Research Center in Beltsville, Maryland.



This formidable "face" belongs to *Chelonus narayani*, a parasite of *Heliothis*—a major pest of cotton, corn and other crops. With the scanning electron microscope, researchers can observe the three dimensional surface structure of minuscule objects in detail never before possible (PN-4129).



Entomologist Raymond J. Gagné with some of the major research "products" of the Systematic Entomology Laboratory. He is examining a color plate from a USDA-supported volume on the moths of America north of Mexico. This recent book is but one in a priceless collection of entomological literature spanning two centuries in the joint Smithsonian-USDA library at the Institution's Museum of Natural History (0277x148-19A).

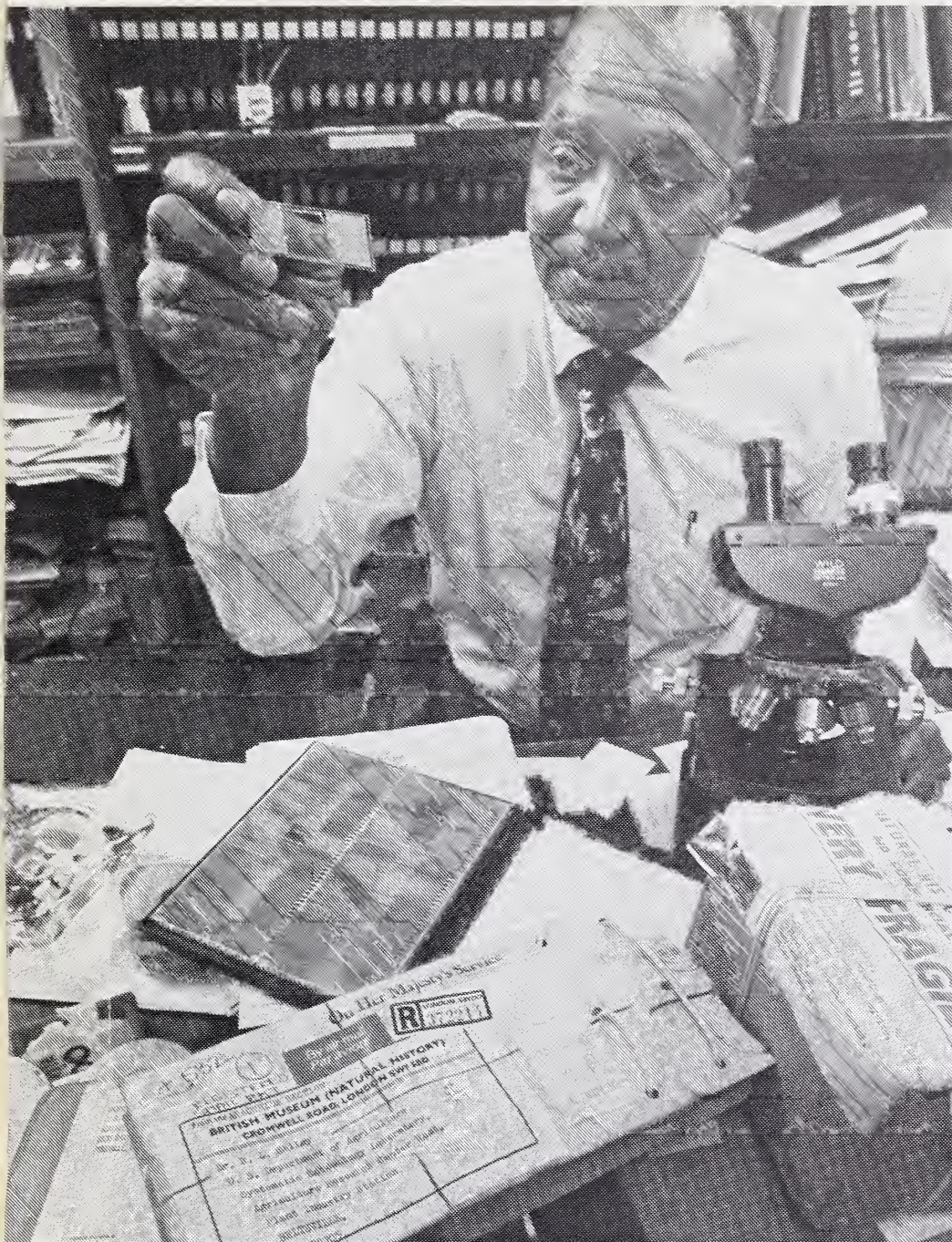
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Each year Systematic Entomology Laboratory scientists identify almost 350,000 insect and mite specimens from around the world. Entomologist Robert L. Smiley studies slide-mounted mites, his research specialty. Over 30,000 mite species have been described worldwide. Relatives of spiders, most mites are so tiny they must be studied with a microscope, although some species are as large as raisins. Mites carry diseases from plant to plant and feed on plant juices, costing agriculture millions of dollars each year (0377x322-26A).

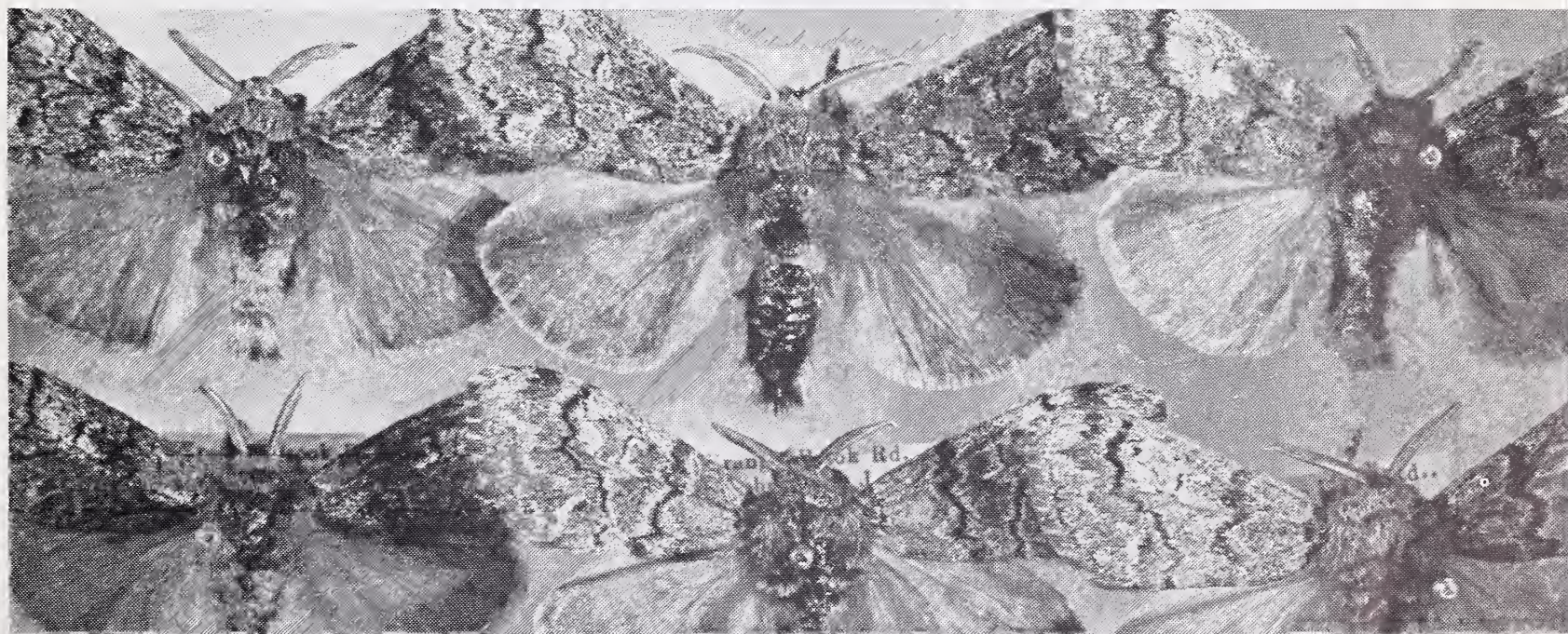
Identical to the untrained eye, each of these tussock moths, pests of pine trees, in Wisconsin and Minnesota, shows slight but significant differences to entomologists at the Systematic Entomology Laboratory. Nuances of pattern and color within a species must be known before positive identification can be made (0277x184-19).

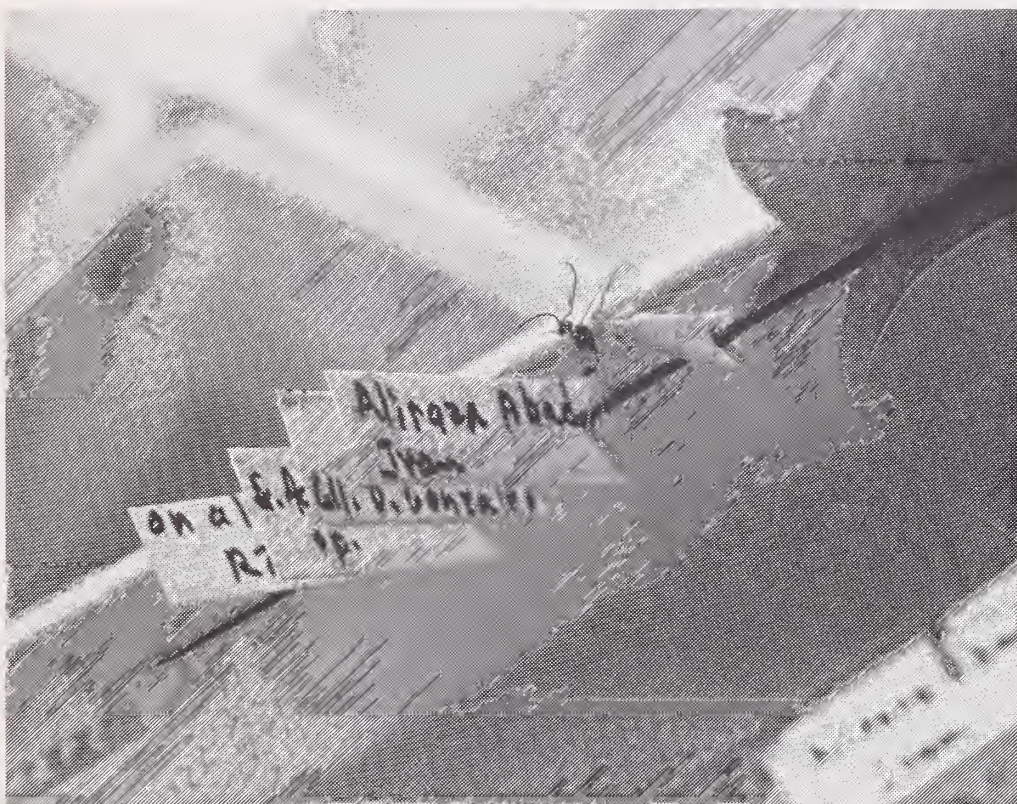
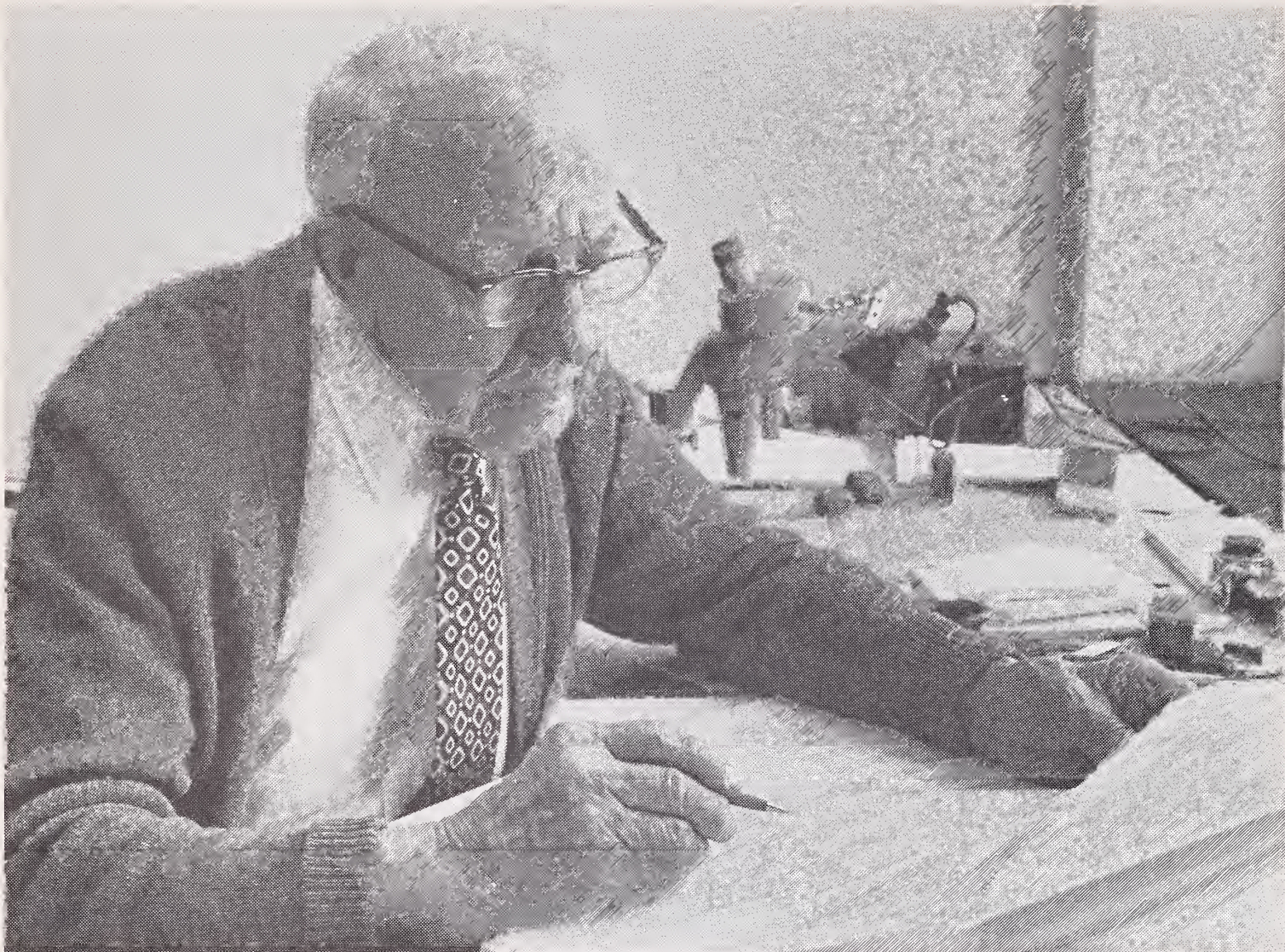




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Carl F. W. Muesebeck corrects a computer printout for a catalog on *Hymenoptera* (bees, wasps, ants, and sawflies) in the United States and Canada. Though retired from USDA for over 20 years, the 83-year-old entomologist arrives at his desk at the Museum every day at 6 a.m. and works until 1 p.m.—7 days a week. Formerly Chief of the ARS Insect Identification Branch, Mr. Muesebeck also studies wasps and edits Russian translations of entomological publications (0277x182-27A).

This tiny (5mm long) parasitic wasp from Iran, *Praon barbatum*, may be a valuable biological control agent against the pea aphid, a pest of alfalfa and other legumes. The wasp was sent to SEL for positive identification. Entomologist Paul Marsh, who specializes in parasitic wasps, analyzed the specimens using museum collections and existing literature to identify it as *Praon barbatum*. If an insect is not found in these references, it is described, named, and added to entomological literature (0676x685-19).



Big and Little: Dr. John M. Kingsolver shows museum visitor Tina Dolan dramatic comparisons in insects' size that SEL scientists have arranged to demonstrate the diversity of the National Collection (0277x149-24).

